3D foot reconstruction systems – fabrication of the foot insole

BICRO PoC

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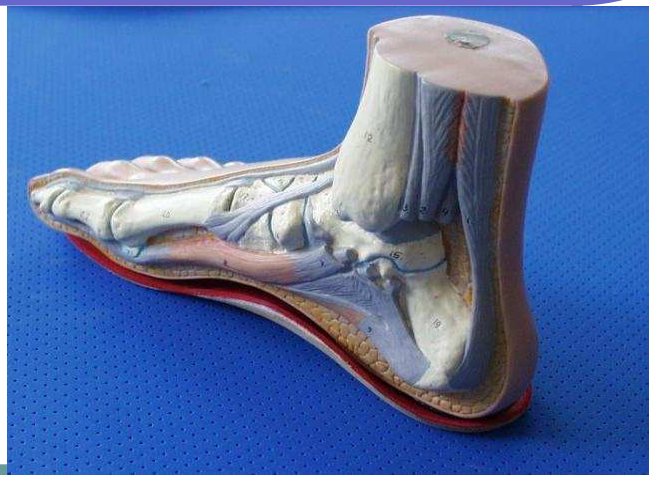
Zagreb, 21. 09. 2012.



Project participatnts

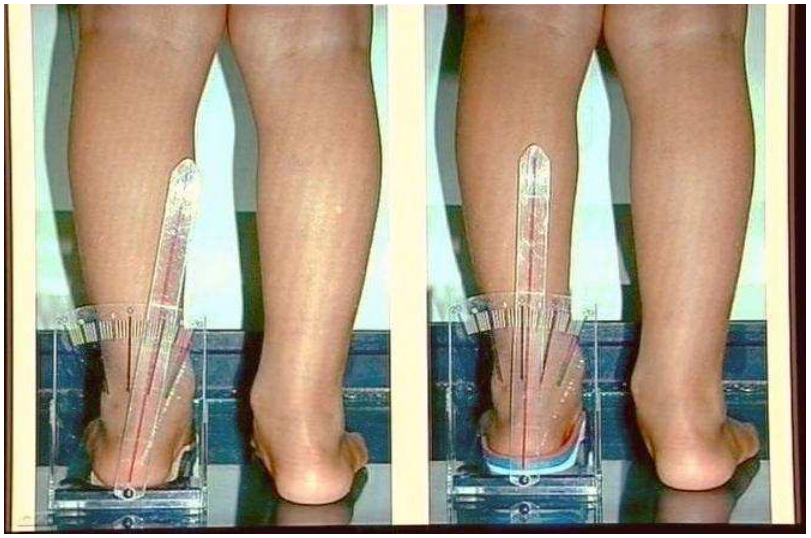
- Faculty of electrical engineering and computing, University of Zagreb, www.fer.hr
  - Department of Electronic Systems and Information Processing
  - Project leader: doc.dr.sc. Tomislav Pribanić

- Collaborators:
  - Polyclinic for physical medicine and rehabilitation “Peharec”, Pula, www.peharec.com

  - University of Girona, Spain, Institute of Informatics and Applications, Computer Vision and Robotics (VICOROB) http://iiia.udg.es/

3D foot reconsctruction

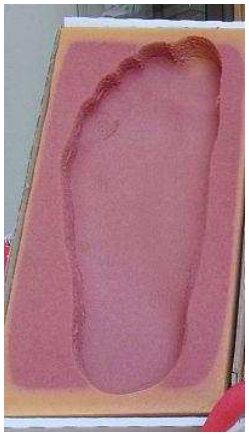
- Motivation: prevention and treatment of various pathologies and deformities (plantar fasciitis, planovalgus, cavus feet):
  - diabetic foot
  - children population: substantial increase of foot deformities



- 3D foot scan→ 3D model

Pipeline

- **1** Making a foot imprint

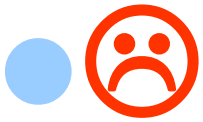


- **2** 3D scanning

- **3** 3D model (post)processing; CAD/CAM software

- **4** CNC machine

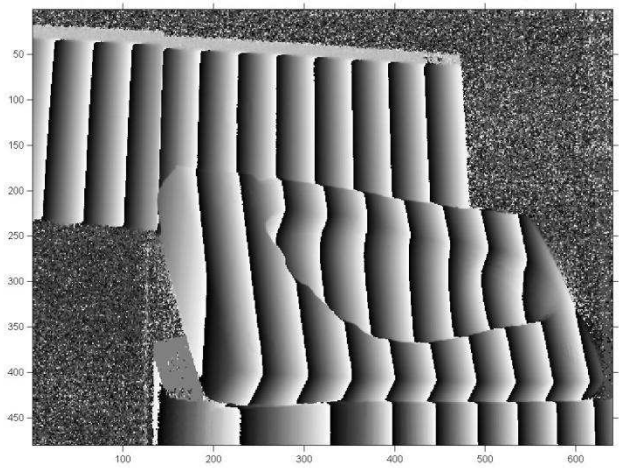
Typical technologies vs. developed solution



Typical 3D foot scanners	Proposed solution
Relatively expensive, specialized laser scanners, complex hardware	Widely available and affordable (video) projectors, flexible hardware design and set up
Relatively long period needed for data acquisition (~10 seconds), subject needs to remain still	Data acquisition period ~second, determined by camera/projector frame rate and number of images projected
Scanning the foot (imprint) from a single view only	Multiview reconstruction, higher quality raw data for a post processing (CNC machine)
3D surface registration solved by rotating platforms, robot arms	SW solution (passive stereomatching, markers), no additional hardware needed
Practically impossible to use scanner for applications other than foot scanning	General purpose 3D scanner, easily adoptable for other applications

Absolute phase map

- minimum of two relative phase maps required



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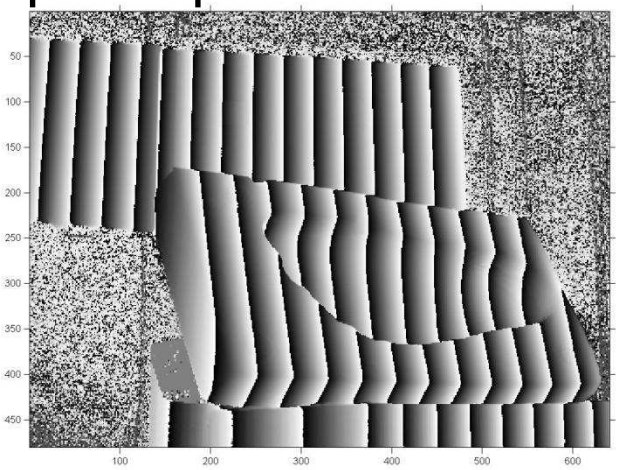

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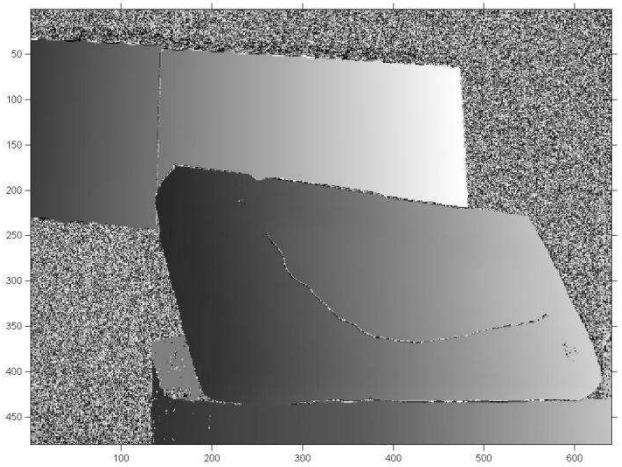
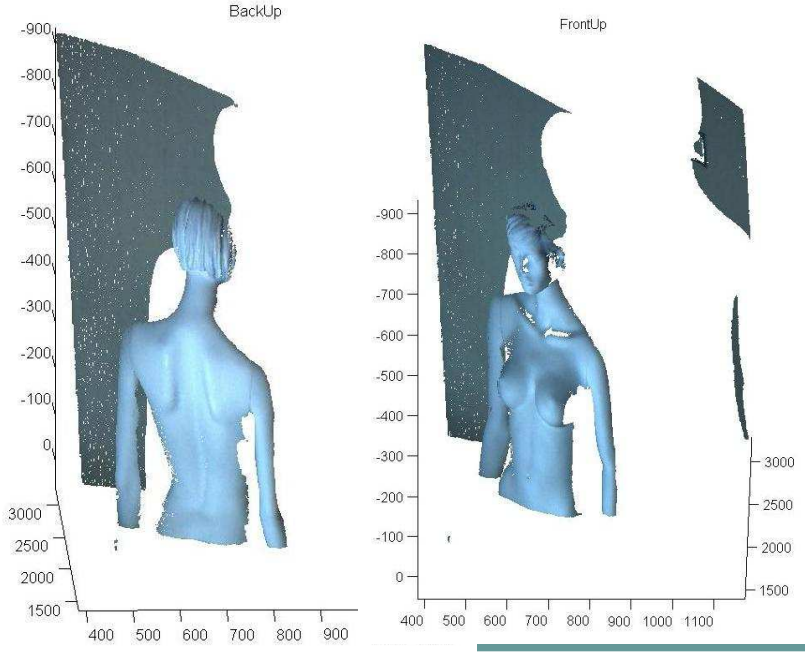


Development phases

- purchase of affordable camera and consumer video projector
- development of multiphase shifting method, as one of SL strategy
- camera/projector synchronization
- software solution for 3D surface registration
- long term goal: partner for further system development / spin off company

Further system development

- Human back 3D scanning, full body scanning



- 3D face scanning